Preliminary Observations Regarding Treatment Outcomes in Patients Treated with Maxillary Implant Overdentures in a University Clinic

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Purpose: To evaluate the outcome of maxillary implant overdenture treatment in a selected patient sample. **Materials and Methods:** Eighteen out of a total of 26 patients who were prescribed overdentures supported by two to six implants each attended a follow-up clinical assessment. Evaluative criteria included oral health–related quality of life records using the OHIP-14 questionnaire. **Results:** Good stability and retention were observed, and mechanical failure items were recorded in eight patients. No significant differences in OHIP-14 scores were found between patients treated with two to three implants and patients treated with five to six implants, or between groups treated with a denture with palatal or horseshoe design coverage. **Conclusion:** Maxillary implant overdenture treatment was assessed as a viable treatment option for the selected patient sample, even when only two supporting implants were prescribed. *Int J Prosthodont 2015;28:637–640. doi: 10.11607/ijp.4384*

mplant-supported overdentures are often proposed as the best treatment option for managing problematic edentulous maxillae. The preferred minimum number of prescribed implants is widely regarded as four to six,¹ and using only two maxillary implants is rarely recommended.

Anatomical considerations, such as bone quality and quantity and sinus size, may complicate maxillary implant placement and require bone grafting for adequate implant placement and positioning and ensuring a correct interocclusal relationship.

Published reports indicate that lower maxillary implant survival outcomes and more frequent prosthetic complications occur when compared with mandibular overdentures.^{1,2} Management of our selected sample of patients reflected our premise that using different numbers of implants and different palatal coverage designs for maxillary overdentures can provide functional satisfaction and oral health-related quality of life (OHRQoL) satisfaction.

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Materials and Methods

Between 1992 and 2013, a total of 26 patients were treated in the department with maxillary implant overdentures because they were clinically diagnosed as prosthetically maladaptive. Three of the patients were excluded from this report because of specific morphological features resulting from traumatic or congenital anomalies that required implant-retained obturator type prostheses. Of the other 23 patients, 18 (10 women, 8 men; mean age: 62 years, range: 41 to 75) attended this follow-up clinical assessment. One patient (1/23) had died, two (2/23) did not want to participate because of the long distance from their homes, and two (2/23) could not be reached due to changes in address.

Five patients (5/18) were treated from 1992 to 1998, and 13 between 2004 and 2013 (Table 1). The mean follow-up time was 6.6 years (range: 7 months to 14 years). Individual OHRQoL was evaluated using an Oral Health Impact Profile-14 (OHIP-14) questionnaire.

The clinical examination included traditionally reported prosthetic assessments: retention, stability, occlusion, integrity of construction of used materials, and peri-implant mucosal changes. Retention and stability were recorded as good, moderate, or poor.³ Probing depth was assessed using a ball-ended periodontal probe (tip diameter: 0.5 mm) with 2-mm graduations (LM-instruments) at every implant surface. The amount of plaque was recorded using the modified Plaque Index (mPI), and bleeding of the marginal periimplant tissue was evaluated with a modified sulcus bleeding index. The existence of mucosal hyperplasia

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Table 1	Distribution	of 18 Patients	with Implant	-Supported	Maxillary	Overdentures
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-			Follow-up	Implant	No. of implants	No. of implants	No. of implants		Time from implantation to use
Patient	Sex	Age	time (mo)	system	placed	lost	in exam	Bone grafting / donor site	of prosthesis (mo)
Patients treated 1992–1998, examined in 2007									
1	Μ	65	140	Straumann	6	0	6	-	5
2	Μ	62	169	IMZ	8	3	5	-	10
3	F	74	163	IMZ	7	3	4	lliac crest with Ti-mesh and HA	8
4	F	56	112	Astra	4	0	4	lliac crest and sinus lift	6
5	М	71	107	Astra	6	0	6	lliac crest and sinus lift	7
Patients t	treated 2	2004-2013	3, examined	in 2014					
6	F	61	97	Straumann	6	0	6	lliac crest and sinus lift	6
7	F	71	96	Straumann	2	0	2	-	6
8	М	53	49	Straumann	4	0	4	-	6
9	F	58	98	Straumann	6	0	6	lliac crest and sinus lift	5
10	F	64	68	Straumann	2	0	2	Bur debris	4
11	F	65	28	Straumann	5	0	5	Iliac crest and sinus lift and Bio- Gide	12
12	М	40	59	Straumann	4	0	4	Tuber and Bio-Gide	2
13	Μ	75	69	XiVe	5	1	4	lliac crest and sinus lift	3
14	F	59	7	XiVe	4	0	4	lliac crest and sinus lift	3
15	Μ	61	53	Straumann	4	0	4	-	4
16	F	62	14	Straumann	4	1	3	lliac crest and sinus lift	7
17	Μ	64	66	XiVe	4	0	4	lliac crest and sinus lift	4
18	F	55	40	XiVe	4	1	3	lliac crest and sinus lift	8

F = female; M = male; HA = hydroxylapatite.

Table 2 Patients' Prosthetic Status at the Follow-Up and Post-Treatment Problems

Patient	Attachment	Palatal	Prosthetic complications/need for relining or repairs of implant overdenture at time of follow-up	Retention	Stability	Mucosal
1	Ball	Yes	No	Good	Good	Moderate
2	Bar	Yes	No	Good	Good	No
3	Bar	Yes	Slight fracture line in the acrylic base	Good	Good	Moderate
4	Bar	Yes	One clip matrix moving	Good	Good	Moderate
5	Bar	Yes	No	Good	Moderate	Abundant
6	Bar	Yes	No	Good	Good	No
7	Ball	Yes	No	Good	Good	Moderate
8	Locator	No	Fracture of artificial tooth	Good	Good	No
9	Bar	No	No	Good	Good	Moderate
10	Ball	Yes	Slight fracture line in the acrylic base	Good	Good	Moderate
11	Ball	No	No	Good	Good	Moderate
12	Ball	No	No	Good	Good	Moderate
13	Bar	Yes	No	Good	Good	Abundant
14	Locator	No	No	Good	Good	No
15	Ball	Yes	Fracture of artificial tooth	Good	Good	Moderate
16	Locator	Yes	Loosening of Locator abutment on the implant	Moderate	Moderate	No
17	Bar	No	Two clip matrices moving, need for relining	Good	Moderate	Moderate
18	Locator	Yes	Fracture of artificial tooth, relining optional	Good	Good	No

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Attachment system	Palatal coverage	Mandibular dentition
Ball	Yes	Removable partial denture
Bar	Yes	Removable partial denture
Bar	Yes	Removable partial denture
Bar	Yes	Implant-supported overdenture
Bar	Yes	Implant-supported overdenture
Bar	Yes	Own teeth
Ball	Yes	Own teeth
Locator	No	Removable partial denture
Bar	No	Own teeth
Ball	Yes	Own teeth
Ball	No	Own teeth
Ball	No	Complete denture
Bar	Yes	Own teeth
Locator	No	Own teeth
Ball	Yes	Own teeth
Locator	Yes	Own teeth + implant bridges
Bar	No	Own teeth
Locator	Yes	Removable partial denture

Problems documented in patient files and after follow-up examination

Several relinings, acrylic base fracture, mucosal hyperplasia, activation of matrices, overdenture renewed

Peri-implant problems soon after delivery of overdenture, several surgical procedures and conservative treatment, several relinings and repairs, reconstruction modified having palatal coverage, loss of all the implants finally

Several surgical procedures eliminating mucosal hyperplasia, relinings, overdenture renewed and implant bar, loss of 3 implants

Mucosal hyperplasia and surgical treatment, relining

Several surgical procedures eliminating mucosal hyperplasia, relinings, fracture of attachment system

Several surgical procedures eliminating mucosal hyperplasia, acrylic base fractures, relinings

Some matrices replaced, one ball abutment replaced to higher one, stomatitis, relining

Matrices falling out of denture base, abscess with an implant and surgical treatment, peri-mucositis and peri-implantitis

Abundant hyperplasia formation with bar, surgical treatment, several courses of antibiotics, relining

Loosening of matrices, activation of matrices, replacing of fractured matrices, replacing of fractured bar construction

The rims of horseshoe shape prosthesis compress the mucosa Stomatitis, relining

Several matrices replaced often because of loosening, relining

Matrices replaced several times, acrylic base material fracture

Table 3 Mean Modified Plaque Index (mPI), Mean Modified Sulcus Bleeding Index (mBI), and Mean Pocket Depth Measured on Different Implant Surfaces in Maxilla⁴

	Mesial	Distal	Buccal	Palatal
mPI	0.62	0.57	0.51	0.47
mBI	1.33	1.39	1.22	1.37
Pocket depth (mm; range = 1-10)	3.125	3.474	2.513	4.079

around the implants and abutments was recorded as none, moderate, or abundant. Panoramic radiographs were taken after the clinical examinations.

Statistical analysis of the results concerning plaque and bleeding indices and associations between sulcus pocket depths was performed using a two-level hierarchial analysis of variance model with the SAS mixed procedure (SAS Enterprise Guide 4.3, SAS). The OHIP-14 questionnaire was analyzed using the Student *t* test and Mann-Whitney test using SPSS version 20.0 software (SPSS). The study was approved by the Ethical Committee of the Northern Ostrobothnia Hospital District.

Results

The total number of implants placed was 85. Five additional implants replaced those lost during the osseointegration phase or later. An additional implant was placed for extra overdenture support in one patient (Table 1). Nine implants were lost (six IMZ, two XiVe, and one Straumann), and the remaining 76 were examined at the final assessment. Final prostheses with implant connections were completed approximately 5.4 months after implantation, and related details are presented in Table 1.

Stability and retention of the overdenture was recorded as good in most patients (Table 2). Moderate mucosal hyperplasia around the implants was recorded in 10 cases and abundant hyperplasia in 2 cases. The amount of plaque and bleeding did not differ significantly between different implant surfaces (Table 3).

No statistically significant differences in OHIP-14 scores were found between patients treated with two to three implants and patients treated with five to six implants, or between groups treated with a denture with palatal coverage and with a horseshoe design (Figs 1a and 1b).

Discussion

Implant-supported maxillary prostheses have already been shown to improve patient perceptions of



Fig 1 Mean OHIP-14 scores between patients treated with two to three, four, or five to six implants (a) and between groups treated with a denture with palatal coverage or with a horseshoe design (b).

OHRQoL while facilitating chewing and enhancing dental esthetics. In this report, no clear differences were found in prosthesis retention and stability when comparing patients with more implants (five to six) to those with only two. In fact, two patients with two implants survived well and with no more problems or prosthetic repairs than patients with more implants. While it may be presumed that an overdenture without palatal coverage requires additional adjunctive supporting implants, it seems that the presence or absence of such coverage did not affect patient satisfaction in this group of patients. Moreover, no significant differences were noted between the different retentive systems, ball or bar.⁵ The Locator connection is reported to be least susceptible to damage, although our observations differed from this finding.

The inherent shortcomings of this mixed time term retrospective and observational report are readily acknowledged. Our intent is to share one clinic's collective observations from a convenient sample of available patients treated over variable time frames and using diverse numbers of implants and attachment methods for support as well as different amounts of palatal coverage. The sample size was limited since the total number of patients treated with maxillary implant overdentures is low in our University Hospital (ie, in public health care). Moreover, given the time frame context, variations in overall prosthodontic treatment planning reflected diversity as per prognostic considerations for each patient. For example, implant overdenture treatment is time-consuming, demanding, and expensive—considerations that make it tempting to consider the desirability of using a minimum of 2 implants in suitable circumstances. Furthermore, mandibular implant overdenture treatment is common and extensively reported, since prosthetic maladaptation is more frequently encountered in the mandible than in the maxilla.3

It was also observed that routine recall maintenance, following of any required aftercare, and adequate daily oral hygiene were essential to achieve and maintain successful treatment outcomes.

Conclusion

Suitable patient selection that reconciles individual biological risk factors with careful surgical and customized prosthodontic treatment appear to contribute to successful maxillary implant overdenture treatment outcomes. In fact, some patients may also be treated cost-effectively with only two supporting implants, although it seems logical to recruit additional treatment options (eg, consideration of more implant support and even bone grafts) when more challenging morphological and other clinical determinants are present.

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